PRELIMINARY NATURAL RESOURCE SURVEY

OLIN CORPORATION

MCINTOSH, ALABAMA

PREPARED BY:

U. S. FISH AND WILDLIFE SERVICE
ECOLOGICAL SERVICES FIELD OFFICE
DAPHNE, ALABAMA

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TABLE OF CONTENTS

SITE DESCRIPTION

The Olin Corporation plant is located east of McIntosh in southwest Washington County, Alabama. The property is adjacent to and in between the Southern Railroad and the Tombigbee River at approximately 82°W longitude, 31°15'N latitude.

The McIntosh area is in the Southern Pine Hills District of the Gulf Coastal Plain physiographic province. The Southern Pine Hills is a moderately dissected plain that slopes gently to the south. The plant site is on the alluvial floodplain and terrace deposits along the Tombigbee River. The most prominent feature of the area is a 40-foot bluff which crosses the east side of the plant property and forms the boundary between the river floodplain to the east and the upland area to the west. The bluff runs north and south and intersects with the river south of the plant at McIntosh Landing. During periods of high river flow, usually December-March, water backs up the bluff to the 25-foot contour, creating a large overflow wetland between the bluff and the river.

The Olin manufacturing facility is on the terrace which has a gently rolling topography ranging from less than 30 feet to over 50 feet above mean sea level. The floodplain is flat with an elevation of approximately 10 feet above mean sea level. The upland area surrounding the plant site is dominated by longleaf pine (Pinus palustris) with a herbaceous understory. Loblolly (P. taeda) and slash pine (P.. elliotii) occur sporadically throughout the area. Transition areas along the bluff are dominated by typical upland hardwood species, including white oak (Quercus alba), southern red oak (Q. falcata), sugarberry (Celtis laevigata), and various hickories (Carya spp.). Understory species along the bluff include flowering dogwood (Cornus florida), seedlings of overstory tree species, and Vitis sp.

The floodplain below the bluff can be characterized as temporarily flooded bottomland hardwoods, semi-permanently flooded bottomland hardwoods, and ponds and lakes. Temporarily flooded areas are those that are flooded at least part of the dormant season. These are the areas that flood during December-March when the Tombigbee River overflows its banks and water moves overbank toward the bluff. Much of the area below the bluff can be placed in this category. Tree species typical of southern overflow floodplain forests occur in this area including representatives of both red and white oak groups such as overcup oak (Q. lyrata), swamp chestnut oak (Q. michauxii), Shumard oak (Q. shumardii), willow oak (Q. phellos), water oak (Q. nigra), and laurel oak (Q. laurifolia). In addition to oaks, many other overstory species occur in the area including water hickory (Carya aquatica), American elm (Ulmus americana), planertree (Planera aquatica), sweetgum (Liquidambar styraciflua), sycamore (Platanus occidentalis), red maple

(Acer rubrum), and green ash (Fraxinus pennsylvanica). Understory vegetation in these areas consists of both woody and herbaceous vegetation. Principal woody understory consists of flowering dogwood, American hornbeam (Carpinus caroliniana), Vitis sp., and Viburnum sp. Herbaceous understory consists of greenbriar (Similax sp.), peppervine (Ampelopsis arborea), and, especially in more open areas, various species of seed-producing grasses.

Semi-permanently flooded areas are those that are flooded all of the dormant season in most years and, in some years, flooding extends into the growing season. Trees in these areas are those that can withstand extended periods of flooding. Since there are few species that can withstand flooding during the growing season, tree species diversity is low in these areas. The dominant species are bald cypress (Taxodium distichum) and water tupelo (Nyssa aquatica), with little understory vegetation.

The ponds and lakes may increase or decrease in size, dependent upon rainfall and riverstage, but some part remains under water during the entire year. There are a number of these ponds and lakes in the floodplain, the largest being the "Olin Basin."

There are two principal soil types in the area. The first general soil type occurs on the terrace deposits in the vicinity of the plant. These soils are moderately well drained with low permeability.

Poorly drained, low permeable soils occur below the bluff along the river. These soils were formed from silty clay deposits in the floodplain alluvium and are saturated during most of the year.

Southeastern Washington County is underlain by alluvium and low terrace deposits of Pleistocene age and sediments comprising an undifferentiated Miocene series. The alluvial deposits consist of about 60 to 100 feet of alternating layers of sand, gravel, and clay. Underlying the deposits are over 700 feet of alternating layers of sand, gravel, and clay of Miocene age.

Two separate aquifers, the alluvial and the Miocene, occur at the site. The alluvial deposits are under semi-confined conditions. The aquifer is recharged from rainfall and infiltration of water from streams, lakes, and various other impoundments. The gradient of the water surface is toward the southeast. The ground water in the underlying Miocene age sand and gravel is under confined conditions and is highly mineralized. The results of hydrogeologic investigations have established that the two aquifer systems are hydraulically separated.

BACKGROUND

In 1952 Olin Corporation began operating in McIntosh with the manufacture of chlorine and caustic soda using the mercury cell process. In 1956 the company constructed a pesticide and organic chemical plant. In 1981 Olin closed the organic plant and switched from the mercury cell process to the diaphragm cell process. In addition to chlorine, the company presently produces sodium chlorate, sodium hypochlorite, and sodium chloride.

In the past Olin utilized three surface impoundments which have contributed to groundwater contamination within the area. The impoundments were the weak brine and and the stormwater and filter backwash ponds.

Weak brine for the mercury cell units was recycled to the weak brine pond where the brine sludges containing mercury were allowed to settle out. Prior to 1972, the filter backwash from the mercury cell production facility was sent to the weak brine pond. After 1972 the filter backwash ponds were constructed to receive the filter backwash waste. In addition, various mercury-contaminated water streams were also sent to the weak brine pond.

As part of the closure plans for the filter backwash pond and the stormwater pond, the remaining hazardous waste sludge in these ponds was removed and disposed of in the weak brine pond. Closure plans for these ponds were approved by the Alabama Department of Environmental Management (ADEM) and the U.S. Environmental Protection Agency (EPA) for implementation on November 14, 1984, and November 30, 1984, respectively. Closure plans for the weak brine pond were approved by ADEM and EPA on July 13, 1985, and August 23, 1985, respectively. Closure of the filter backwash pond and stormwater pond have been completed and closure certifications sent to EPA/ADEM. Olin also operated a landfill that received acids and organic waste in the 1950's, which was closed in the 1970's.

Extensive groundwater monitoring has been conducted at the plant site. Groundwater under the impoundments was found contaminated with mercury, lead, and chromium. The area under the landfill was found impacted by a variety of chlorinated aromatic compounds. Of the compounds analyzed, chloroform, benzene, chlorobenzene, and dichlorobenzene occurred in higher concentrations. Elevated levels of mercury were found in groundwater samples collected beneath the impoundments. Analyses of sludge samples from the weak brine pond reported mercury ranging between 111-498 ppm.

Groundwater investigations have found that flow generally moves southward from the north property boundary. It then splits into two components, eastward and westward. The eastward component discharges to the Tombigbee River, which is approximately one mile east of the

plant proper. The westward component discharges into the Bilbo Creek drainage approximately 3 miles southwest of the Olin facility.

Levels of contamination and extent of migration from the source were found to be greater in the western plume than the eastern. The highest levels of organic pollution were 6 ppm for dichlorobenzene in the central part of the westward plume. In the eastward plume, levels were found at 0.097 ppm. Chlorobenzene was found at 5 ppm in the westward plume and 1.3 ppm in the eastward plume. Chloroform was 1 ppm in the west and 0.4 ppm in the east. Benzene was 0.260 ppm at the west end and 0.1 ppm at the east end. There has been no known groundwater monitoring conducted outside of the plant boundary, however, wells sampled along the company property line were not found to be contaminated.

CURRENT STATUS

The Olin McIntosh facility has now closed the organic plant and converted from the mercury to the diaphragm cell process for the manufacture of chlorine. The facility also produces sodium chlorate, sodium hypochlorite, and sodium chloride.

On September 1, 1986, Olin was issued a Resource Conservation and Recovery Act (RCRA) permit to conduct post-closure care for the cover on the former weak brine pond and corrective action for groundwater contamination at their McIntosh, Alabama, facility. Mercury will be removed by pumping contaminated groundwater from four wells and treating the water in carbon absorption treatment systems. The treated wastewater will be discharged into the Tombigbee River under an NPDES permit. The intent is to remove contaminated groundwater and prevent migration from the plant site.

TRUST RESOURCES

On October 23, 1986, an inspection was conducted by Fish and Wildlife Service (Service) personnel at the Olin facility in McIntosh, Alabama, to determine if natural resources under the trusteeship of the Department of Interior were present in the vicinity of the plant and, if present, determine if damages have occurred or the potential exists for such damages as the result of company activities. Trust responsibilities considered in this investigation were: Service lands, migratory birds, anadromous fish, endangered species and their critical habitat, and certain marine mammals.

Contaminated ground water has been reported to migrate from the on-site source in an east/west direction. To the west of the plant the terrain increases in elevation creating a basic mixed pine/upland

hardwood type habitat. The area did not appear to contain any of the trust resources evaluated in this investigation.

To the east of the plant the predominant geologic feature is a 40 foot bluff running north and south which merges with the Tombigbee River 0.75 miles southeast of the plant. The most significant wetlands in the area are found between the bluff line and the river. On the east side of the Olin facility, which is the projected direction of ground water flow in this area, the bluff gradually converges with the river, leaving only an approximate 500 foot strip of swamp between the bluff and the river.

The Olin Basin is a 100 acre lake located below the bluff and 0.6 miles north east of the plant. It collects much of the surface runoff from the adjacent swamp and probably ground water leachate originating along the bluff line. The south end of the basin is connected to the river via a narrow ditch.

Service Lands

There are no Service lands in or near the area of this investigation; the closest being the Choctaw National Wildlife Refuge located 40 miles north of the Olin site. There is no indication that the refuge has been affected in any way by the plant's activities.

Anadromous Fish

Three species of anadromous fish utilize the Tombigbee River in the McIntosh area: the Atlantic striped bass (Morone saxatilis), the Alabama shad (Alosa alabamae), and the Atlantic sturgeon (Acipenser oxyrhynchus).

The Alabama Department of Natural Resources, Division of Marine Resources, annually releases striped bass into the Mobile River below the confluence of the Alabama and Tombigbee Rivers. This program was initiated in 1965 and expanded in 1973 with the opening of the hatchery at Gulf Shores, Alabama. Since 1981, 32,400 striped bass have been released. The state presently has a goal of stocking 20,000 4-10 inch fish annually. As a result of these efforts, the Tombigbee River system now enjoys a modest striped bass fishery. The Alabama shad and the Atlantic sturgeon are only occasionally found in the lower Tombigbee River.

In 1969 the Service initiated a national contaminant monitoring program to develop baseline and trend data regarding contaminant levels in fish tissue.

Whole fish analyses of largemouth bass collected at the McIntosh station on the lower Tombigbee River, adjacent to the Olin facility, between 1969 and 1973 found mercury levels between 0.65 and 1.10 ppm.

This compares with a mercury range of 0.11 - 0.60 ppm for largemouth bass during the same time period at a station on the lower Alabama River which is adjacent to but a separate drainage from the Tombigbee. The average mercury concentration of all samples analyzed in the national monitoring program between 1969 and 1971 was 0.15 ppm.

The results of a limited data base indicate that fish in the Tombigbee River at the Olin plant appear to have concentrated mercury at elevated levels and above those found in identical species in an adjacent river system. It is probable that anadromous species in the lower Tombigbee River could, as well, have been contaminated with mercury and that these impacts could have continued to the present. The prime suspect for mercury contamination of the river at McIntosh is Olin Corporation since they are the only industry in the area known to have produced mercury as a waste product.

Endangered Species/Critical Habitat

The only resident endangered species known to occur in the vicinity of the Olin facility is the American alligator, Alligator mississippiensis. A number of open water ponds and lakes are found in this area which retain water throughout the year. During the high river stages each year the entire wetland is flooded. These open bodies of water along with the apparent abundant food supply create ideal habitat for the alligators.

Marine Mammals

There are no marine mammals known to occur in the vicinity of the Olin plant.

Migratory Birds

The greatest potential for migratory bird contact with contaminated groundwater is to the east of the plant site. The existing wetland habitat available to waterfowl in this area is relatively restricted due to the close proximity of the bluff to the river.

The highest quality wetland habitat appears to be the Olin Basin. Many species of wading birds use this lake, particularly during summer and fall when receding water levels concentrate fish in these permanent water areas. Each winter, large numbers of waterfowl, primarily mallard (Canas platyrhnchos), pintail (C. acuta), wood duck (Aix sponsa), and an assortment of diving ducks use the area.

Although the Olin Basin is located slightly northeast of the projected easterly movement of groundwater, its close proximity to the area of contamination and its high quality habitat warrant further evaluation before the area can be excluded from possible impacts.

DISCUSSION OF IMPACTS

There are three groups of trust resources that could be impacted by contaminated groundwater at the Olin site: anadromous fish, endangered species, and migratory birds.

Striped bass are known to occur in the Tombigbee River in the area of the Olin plant. Elevated levels of mercury have been found in fish tissues of other fish species (largemouth bass) from the river at McIntosh. Striped bass have some similarities to largemouth bass in their life cycle requirements.

The endangered American alligator (Alligator mississippiensis) is known to occur in the Olin Basin and adjacent swamp. Being a secondary predator it would be expected to concentrate and biomagnify contaminants occurring in species within the food chain comprising its diet.

There is a limited amount of wetlands and waterfowl habitat directly to the east of the plant site. However, slightly to the northeast of the site is the Olin Basin which offers an outstanding refuge for a wide variety of waterfowl and wading birds.

Using the available date, it is not possible to determine conclusively if Departmental trust resources have been affected by contaminant discharges from the Olin plant. The primary weakness of the existing data base is the absence of sediment chemistry and tissue residue analyses of endemic species found in the wetland areas and the river to the east of the plant site.

The data used in this evaluation was derived from groundwater samples collected within the plant boundary. There was no monitoring conducted off-site. Although data from wells located around the boundary of the plant did not indicate contamination at the property line, the knowledge of groundwater dynamics is not such that it can be categorically concluded that contaminated groundwater is not moving off-site.

There are two areas of likely groundwater discharge located outside of the plant along the easterly direction of groundwater movement. These areas, the Olin Basin and the Tombigbee River, are also the locations of greatest concern for fish and wildlife resources.

Without adequate sediment and tissue residue data in the Olin Basin and the Tombigbee River, it will be impossible to accurately assess the impacts on Departmental trust resources. Therefore, DOI should not grant any release from liability until such data has been gathered and complete assessments made.

Recommendations or releases resulting from this Preliminary Natural Resources Survey do not deal with or compromise the ability of the United States to prosecute civil or criminal violations of laws or regulations which may be caused by or result from the actions of persons or entities involved in the activities which are the subject of this survey. Further, it should be clear that any other remedy, including monetary damages, for violations of the law or contract provisions existing between the United States and any entity concerned in activity which is the subject of this survey are neither considered nor waived.

RECOMMENDATIONS

It is recommended that a comprehensive biological investigation of tissue residue levels and bulk sediment analyses be conducted in the Olin Basin as well as in the river to determine the extent of contamination and related impacts to the associated biota.

River Monitoring Programs

Two monitoring stations should be established in the river, an upstream control station above the influence of any groundwater discharge and a downstream station to reflect any impacts of the industry on the river. At each station, fish and sediment samples should be collected.

Each sediment sample should be composed of a minimum of five subsamples. Care should be taken to avoid collecting coarse sandy or gravel material, bank soils that have recently sloughed off into the water, or sieving sediments that will be used for volative organic analyses. Efforts should be taken to collect silt and clay size sediments with a high organic content. Contaminants are more likely to adhere to this type of sediment. The number of samples collected will be dependent on river stage and substrate variability in the study areas.

Fish collections at each station should consist of one five-fish composite sample of a predator, one five-fish composite sample of a forage fish or plankton feeder, and one five-fish composite sample of a bottom feeder. In determining the predator species, consideration should be given to using striped bass, if available, since they are a high priority resource. Large sized fish which have had a longer exposure time in the area should be collected if possible. Samples should be taken during low river stages in order to concentrate, in the water column, contaminants occurring in the bottom sediment and again during a time when there is runoff to the river from the adjacent wetlands. Several collections should be made to enlarge the data base to the greatest extent.

Olin Basin Monitoring Program

The investigation of the Olin Basin can be separated into two monitoring systems, sediment and biota. The biological collections should include vertebrate as well as invertebrate species where possible. Fish sampling should conform to the recommendations discussed for the river collections.

Biological samples for contaminant residue analyses should be collected from each major ecological niche in the survey area. Representatives of the following groups should be collected: mammals, birds, reptiles, invertebrates, and fish.

Field collections should be conducted during the summer months when the river stage is low and the animals being monitored are available and active. Control stations should be established to determine baseline levels.

Composite soil samples should be taken at each station. Each sample should be comprised of a minimum of five subsamples. Care should be taken to collect in areas of silts and clays with a high organic content, and avoid sand and gravel substrate types.

The following guidelines should be considered in the selection of monitoring species:

1. Mammals

   - Predatory mammals accumulate higher residue levels than herbivores.
   - Species should be chosen that have a limited home range.
   - Field dwelling house mice, harvest mice, and shrews are good indicators of both organic and inorganic contaminants.
   - Metal levels are usually higher in mammal livers than in kidneys or other tissues.
   - Organochlorine contaminants are bioaccumulated in fat tissues.

2. Birds

   - Seed eating birds are not good indicators of contaminants.
   - Bird kidneys accumulate higher levels of inorganic

contaminants than livers.

- o Female ducks are good indicators prior to nesting because of their increased insect consumption during this time.

3. Reptiles

   - o Water snakes, especially their body fat, are excellent indicators of many organic contaminants.
   - o Turtles are good indicator species because of their relatively long life span and the affinity of their fatty tissue for organic contaminants.

4. Invertebrates

   - o Earthworms are good indicators of cadmium and zinc in the soil, but not for lead, copper, or nickel.

5. o Fish are generally poor metal bioindicators with the exception of mercury, arsenic, and cesium.